

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AG03-005C-PC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US03/09479	International filing date (day/month/year) 27 March 2003 (27.03.2003)	Priority date (day/month/year) 27 March 2002 (27.03.2002)
International Patent Classification (IPC) or national classification and IPC IPC(7): C12N 15/82, 15/90, 15/63; A01H 5/00, 5/10 and US Cl.: 435/419, 468; 800/278, 295, 298		
Applicant AGRINOMICS LLC		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>6</u> sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u> </u> sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input checked="" type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand 07 October 2003 (07.10.2003)	Date of completion of this report 05 April 2004 (05.04.2004)	
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 872-9306	Authorized officer <i>Valerie Bell-Harris for</i> Ashwin Mehta Telephone No. 571-272-1600	

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US03/09479

I. Basis of the report**1. With regard to the elements of the international application:***

- ☒ the international application as originally filed.
- ☒ the description:
pages 1-19 as originally filed
pages NONE filed with the demand
pages NONE filed with the letter of _____.
- ☒ the claims:
pages 20 as originally filed
pages NONE as amended (together with any statement) under Article 19
pages NONE filed with the demand
pages NONE filed with the letter of _____.
- ☐ the drawings:
pages NONE as originally filed
pages NONE filed with the demand
pages NONE filed with the letter of _____.
- ☒ the sequence listing part of the description:
pages 1-2 as originally filed
pages NONE filed with the demand
pages NONE filed with the letter of _____.

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☒ contained in the international application in printed form.
- ☒ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/09479**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims <u>1-6</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>1-6</u>	YES
	Claims <u>NONE</u>	NO
Industrial Applicability (IA)	Claims <u>1-6</u>	YES
	Claims <u>NONE</u>	NO

2. CITATIONS AND EXPLANATIONS

Claims 1-6 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the use of nucleotide sequences encoding SEQ ID NO: 2 to increase drought tolerance in transgenic plants.

Claims 1-6 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

_____ NEW CITATIONS _____

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the questions whether the claims are fully supported by the description, are made:

Please See Continuation Sheet

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/09479**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

VIII. The following observations on the clarity of the claims, description, and drawings or on the questions are made:

Claims 1-6 are objected to as lacking clarity under PCT Rule 66.2(a)(v) because the claims are not fully supported by the description. The application, as originally filed, did not describe: The description indicates that an "activation tagging construct" was used to isolate plants showing an increase in drought tolerance. The construct contained T-DNA, a herbicide selectable marker gene, and a 4XCaMV 35S enhancer. Transgenic Arabidopsis plants comprising the construct were selected at the T1 generation for herbicide resistance. T2 seed were planted, stratified for 3 days at 4°C and grown for 4 weeks with adequate water. The description indicates that water was then withheld for 10-14 days until most plants were severely wilted. Plants that appeared non-wilted were identified and their relative water content measured. Putative drought-tolerant mutants were re-screened. A line designated "W0000017146" was identified as having a dominant drought tolerant phenotype. PCR using primers specific to the vector and Southern analysis were conducted to verify the genomic region into which the T-DNA inserted, and to recover the flanking genomic DNA. Sequence analysis revealed that the T-DNA inserted within about 10 kb of the gene whose sequence is set forth in SEQ ID NO: 1 and in GI 7630025, nucleotides 110251-111012. The predicted amino acid sequence is set forth in SEQ ID NO: 2 and GI 76300027. The description indicates that PFAM analysis predicted a "Dof" (DNA binding with one finger) zinc finger domain, and that Dof proteins are a class of transcription factors containing a highly conserved 52 amino acid motif containing a single zinc finger. The Dof domain of SEQ ID NO: 2 is at amino acids 25-87. The description indicates that RT-PCR analysis showed that the DRO2 gene was specifically overexpressed in the plant line displaying improved drought tolerance (page 17, line 20 to page 19, line 27).

The claims broadly encompass any transgenic plant having increased drought tolerance and comprising a transformation vector comprising any nucleotide sequence encoding the DRO2 polypeptide of SEQ ID NO: 2 or any ortholog thereof; or a method of producing increased drought tolerance in a plant comprising introduction of said vector.

However, the description does not describe nucleotide sequences encoding any ortholog of SEQ ID NO: 2. As discussed above, the description indicates that DRO2 contains a conserved Dof domain. However, the presence of this domain alone does not identify an amino acid sequence as being an ortholog of SEQ ID NO: 2. Papi et al., for example, teach another Arabidopsis gene, DAG1, that also encodes a zinc finger transcription factor belonging to the Dof family. However, DAG1 is involved in the control of seed germination (page 28). The description does not describe any other domains or sequences within SEQ ID NOs: 1 and 2 that are required for their functional activity. Yanagisawa, S. teaches that there is no obvious homology outside the Dof domain in these proteins. Yanagisawa also teaches that, despite the overall conservation of the Dof domain, two regions within it are not conserved, and based on these differences Dof proteins are separated into different subgroups that bind to different DNA motifs (pages 213-214).

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

The instant description does not provide any further information concerning the sequence of SEQ ID NO: 2, and its relation to its functional activity.

Claims 1-6 objected to as lacking clarity under PCT Rule 66.2(a)(v) because of the claims are not fully supported by the description. The description does not disclose the claimed invention in a manner sufficiently clear and complete for the claimed invention to be carried out by a person skilled in the art because: as discussed above, the description indicates that overexpression of the DRO2 gene encoding SEQ ID NO: 2 led to the improved drought tolerance displayed in line W000017146. The claims, however, encompass transgenic plants having improved drought tolerance comprising expressing the complement of a nucleotide sequence encoding SEQ ID NO: 2, or any ortholog thereof. This is in direct contradiction to the teachings of the description. The prior art is lacking in examples showing that the antisense expression of nucleotide sequences encoding SEQ ID NO: 2, or any ortholog thereof, confers increased drought tolerance in transgenic plants. In the absence of further guidance, undue experimentation would be required one skilled in the art to make and use the full scope of the claimed invention.

The description also does not teach any nucleotide sequences encoding any ortholog of SEQ ID NO: 2. The only information provided in the description concerning SEQ ID NO: 2 is that it comprises a conserved Dof domain. However, as discussed above, other proteins that comprise this domain do not have the functional activity of conferring increased drought tolerance to plants. Papi et al., for example, teaches a Dof transcription factor involved in seed germination. The description does not reduce any other nucleotide sequence to practice with the claimed invention.

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NOTE OF INFORMAL COMMUNICATION WITH THE APPLICANT

(PCT Rule 66.6)

International application No. PCT/US03/09479	Applicant's or agent's file reference AG03-005C-PC	Date of informal communication (day/month/year) 02 April 2004 (02.04.2004)
Applicant AGRINOMICS LLC		

<u>Communication</u> <input checked="" type="checkbox"/> by telephone <input type="checkbox"/> personal	<u>Participants</u> <input checked="" type="checkbox"/> Applicant: AGRINOMICS, LLC <input checked="" type="checkbox"/> Agent: Jan Burnelle <input checked="" type="checkbox"/> Examiner(s): Ashwin Mehta	<input checked="" type="checkbox"/> Identity checked <input checked="" type="checkbox"/> authorization checked <input type="checkbox"/> personally known
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Summary of communication:

Examiner inquired with the Applicant's agent whether an International Preliminary Examination Report would be accepted in lieu of the Written Opinion. Applicant's agent indicated that it would.

☐ An extension of time limit is granted (Form PCT/IPEA/427).

☒ A copy of this note is being sent to the applicant with Form PCT/IPEA/429.

PCT/IPEA/424.

Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 872-9306	Authorized officer <i>Ashwin Mehta</i> Ashwin Mehta Telephone No. 571-272-1600
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Form PCT/IPEA/428 (July 1992)